

13. A NOTE ON NESTING BEHAVIOUR IN THE INDIAN GHARIAL
GAVALIS GANGETICUS (GMELIN) (REPTILIA, CROCODILIA)

Virtually nothing has been published about the natural history of the gharial (Neill 1971). There are no published data on the nesting biology as such, however, Malcolm Smith (1931) stated that the clutch consists of forty or more eggs (a comment which has been extensively copied in the literature in the subsequent half century without addition of new data).

The first eggs of this species known to be captive hatched were collected by the author in 1975 and hatched at the Orissa Gharial Project at Tikerpada in June of that year. The eggs and hatching process was described and illustrated in Bustard (1975, 1976).

Bustard (1976) pointed out that nests are dug in high sand-banks to avoid flooding as a result of water level fluctuations during incubation resulting from melting snow in the Himalayan part of their range, and gave the egg-laying season as April, whereas, Smith 1931, in error, stated that the hatchlings appear in March and April.

During a detailed study on the nesting ecology of the gharial in Narayani river, Nepal, the time of egg-laying was noted in six instances. This occurred at 2200, 2245, 2300 and 2400 (three instances) hours respectively.

In addition, the actual nesting process was also observed from its initiation by me on one occasion. Nesting on this occasion however, did not result in egg-laying. The female was not disturbed. It is not known if it was an instance of trial nesting or the female gave up to try elsewhere, most probably it was trial nesting. The following are extracts from field notes recorded at the time on April 13, 1977, at a distance of 90 m across the river through 6×20 binoculars :

- | | |
|---------------|--|
| 6.34 p.m. | female gharial started to emerge on opposite bank near a track leading to trial nests; early twilight. (The sand-bank had a steeply rising portion, height 2-2.5 m, followed by a flat area and then another steeply rising bank of similar height). |
| 6.35 | moved two meters up the steep (45° slope) bank and rested. |
| 6.37 | moved up a further 1 m and again rested. The female measures about 3 m. |
| 6.40 | moved up 1 m and reached the start of the 'platform' after the first incline. |
| 6.43 | moved across platform to foot of next incline (lower here than where the trial nests are), distance 3 m. Moved diagonally towards the other track. |
| 6.45 | moved diagonally up the second incline about 3.5 m. |
| 6.47 | moved up a further 0.5 m. |
| 6.48 | moved about 2 m. |
| 6.49, 30 sec. | moving further up the second bank. |
| 6.52 | digging commenced as light starting to fail, night fast closing in. Fore limbs exclusively used for digging. |
| 6.55 | left front limb actively throwing sand backwards. So far only the front limbs have been used in the excavation, one at a time. |
| 7.02 | has not moved, still digging with (only) the front limbs. Now very hard to see (to write even). |
| 7.10 | now very dark, still in same position but not possible to observe its actions. |

The above field notes indicate a number of points:

1. The slow progression up the steep bank, very reminiscent of the heavier turtles (*Chelonia mydas*, *Dermochelys coriacea*), hauling ashore to nest, (Bustard 1972, Bustard & Singh 1978). These also move extremely slowly up the beach especially where it is steep. This gharial took 18 minutes to reach

the chosen nesting site near the top of the second bank at a height of about four meters above the water level, and at a distance of approximately 11 metres (in a direct line) from the water, a distance of less than four times its own length. These observations confirm the clumsiness of the adult gharial, one of the most aquatic of crocodilians, and explains their invariable habit when basking of staying very close to the water to which they can return with minimum delay if danger threatens, (Singh & Bustard 1977). The gharial did not climb up the bank, 'hauled out' is the more appropriate term, as with sea turtles.

2. The time of emergence at onset of twilight was exactly the time when the first sea turtles also emerge when the high tide is suitable, (Bustard 1972). Probably most gharial haul out somewhat later under cover of nightfall.

3. The time of egg laying (between 2200 and 2400 hours) probably reflects time taken after nightfall to emerge and prepare the nest. There may, however, be selection towards nesting later in the night since this may tend to reduce predation. Foote (1978) noticed a similar phenomenon in *Podocnemis* a large freshwater turtle of the Amazon.

CENTRAL CROCODILE BREEDING AND
MANAGEMENT TRAINING INSTITUTE,
LAKE DALE, HYDERABAD 500 264,
INDIA,

September 12, 1979.

4. All the observed digging was done by the fore-limbs, and these did not work together but separately; that is, a number of excavations were made by one fore-limb, then after a rest period the other fore-limb carried out digging activities. However, it is assumed that the final nest construction is carried out by the hind limbs, which, as in the case of turtles, would appear much better suited (shaped) for handling this task. This procedure is analogous to the process which is followed in sea turtles. The preliminary excavation is carried out by the fore-limbs which clear the area of dry surface sand exposing the firmer, usually moister, substrate in which the egg pit is dug exclusively by the rear flippers (Bustard 1972). The digging observed above is, therefore, assumed to be preliminary to the main excavation.

It is probable, however, that trial nesting is carried out using the fore-limbs.

The above observations are recorded since so little has been reported on nest excavation in any crocodilian species and because it is generally stated or assumed that only the rear limbs are used in nest excavation, see for instance Neill (1971) for the American alligator.

H. R. BUSTARD

REFERENCES

- BUSTARD, H. R. (1972): Sea Turtles: Natural History and Conservation. Collins, London and Sydney.
 — (1975): A future for the Gharial. *Cheetal*, 17 (2): 3-8.
 — (1976): Operation Gharial. *Cheetal* 17 (3/4): 3-6.
 — & SINGH, L. A. K. (1978): Studies on the Indian Gharial *Gavialis gangeticus* (Gmelin) (Reptilia, Crocodilia). Change in terrestrial Locomotory Pattern with Age. *J. Bombay nat. Hist. Soc.*, 74 (3): 534-536.

FOOTE, R. W. (1978): Nesting of *Podocnemis inifilis* (Testudines: Pelomedusidae) in the Colombian Amazon. *Herpetologica*, 34 (4): 333-339.

NEILL, W. T. (1971): The Last of the Ruling Reptiles: Alligators, Crocodiles and their Kin. Columbia University Press, New York and London.

SMITH, MALCOLM, A. (1931): The Fauna of British India including Ceylon and Burma. Reptilia

and Amphibia. Vol. I. Loricata, Testudines. Taylor & Francis, London.

SINGH, L. A. K. & BUSTARD, H. R. (1977): Studies on the Indian Gharial *Gavialis gangeticus* (Gmelin) (Reptilia, Crocodilia) III: Locomotory Behaviour during Basking and Spoor Formation. *British J. Herpetol.* 5: 673-676.

14. SOME OBSERVATIONS ON THE COMMON HOUSE GECKO (*HEMIDACTYLUS FRENATUS*) OF SOUTHERN INDIA

INTRODUCTION

Studies on the food and feeding habits in Indian lacertilian species are few and relate only to *Calotes versicolor* (Dave 1960, Indurkar & Sabnis 1976), *Mabuya dissimilis* (Dave 1960), *Ophiomorus tridactylus* (Rathor 1969), *Varanus bengalensis* (Minton 1960), *Hemidactylus flaviviridis* (Parshad 1916), and *Hemidactylus brooki* (Laximinarayana *et al.* 1975). One of the commonest house gecko in South India is *Hemidactylus frenatus*. Although they are very common yet very little is known about their dietary, reproductive and social behaviour. Data were collected on food, feeding habit, home-range and courtship behaviour of the South Indian house gecko, which is being presented.

MATERIALS AND METHODS

The present report is based on observations on lizard *Hemidactylus frenatus*, resident in some lodges of Bandipur National Park, Mysore. The lizards were collected in the study area by hand. They were marked and sexed. A number was painted on the back of each lizard with black paint. This was visible at a good distance but each lizard was recaptured and repainted after its shedding. The lizards after their capture were released within 3-5

minutes—in the area where they were caught. The lizards released after their marking were found to be nervous for 30-60 minutes before they resumed their normal activities. The sexing of individuals was done by pressing the vent region with the thumb. In males, hemipenis comes out under mild pressure while in females a milky liquid oozes out. The total number of lizards in the study area were 14 (5 ♂♂, 7 ♀♀ and 2 juveniles). The study period extended from 10th of January, 1978 to 15 of March, 1978, which incidentally coincides with the breeding period of the lizard. The largest male and female were measured (see Table) to assess size relation if any, to sexual dimorphism which was not noted. The adult males and females did not show any striking colour pattern differences while the

TABLE

Measurements (mm)	Male	Female
Total body length	127	124
Snout vent length	65	63
Tail length	62	61

juveniles were recorded to have darker dorsum than the adults. Moreover, two rows of interrupted longitudinal bands were quite distinct dorsally that are not sharp and seem to fade out with maturity.